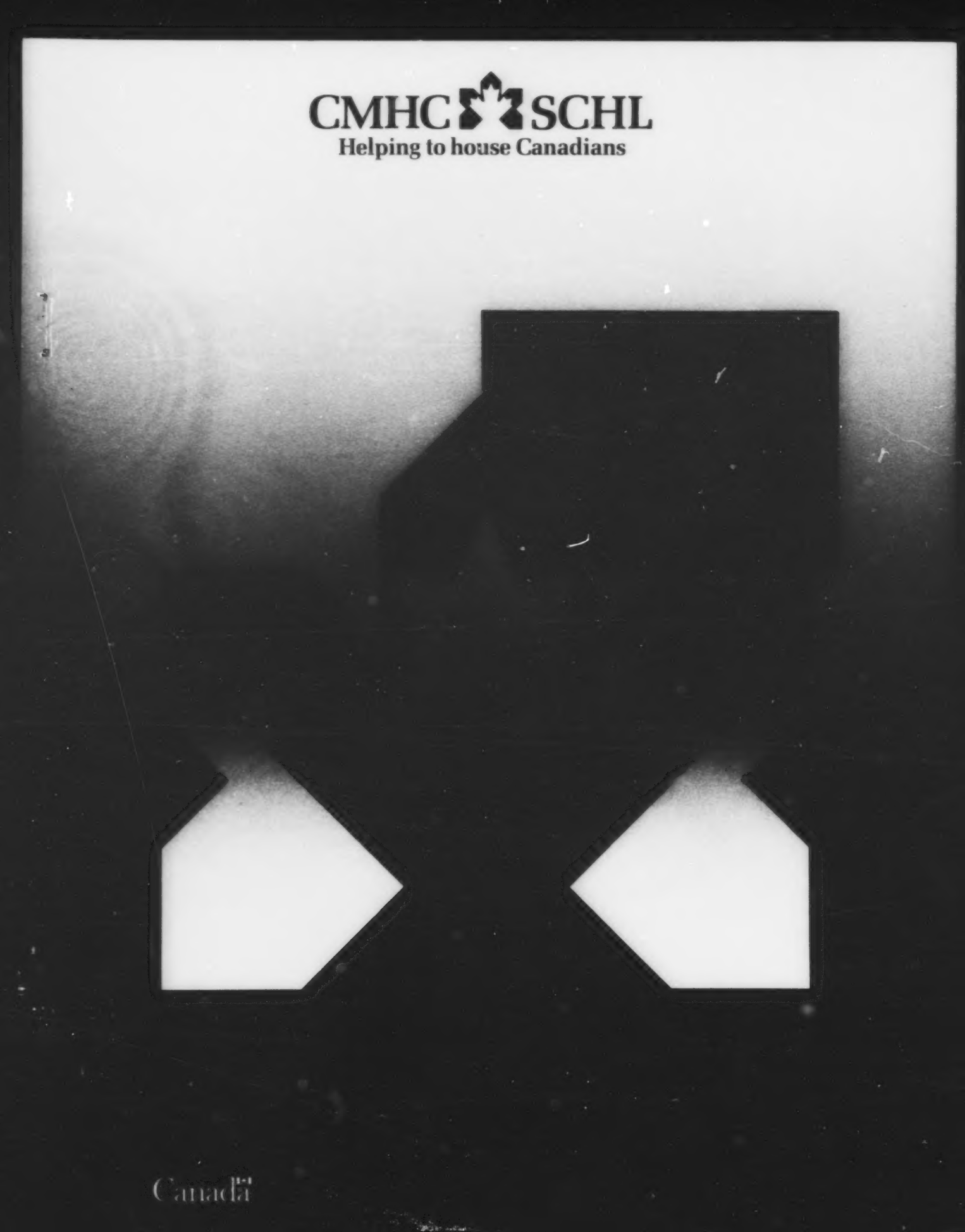
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A COMPENDIUM OF RECENT RESEARCH ON MIGRATION

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MARKET ANALYSIS CENTRE

CANADA MORTGAGE AND HOUSING CORPORATION

DECEMBER 1991

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RÉSUMÉ

A. Les modèles migratoires se répartissent en trois catégories, selon qu'ils sont axés principalement sur :

i) des facteurs économiques (facteurs d'incitation et d'attirance);

ii) des facteurs non économiques (démographiques ou géographiques); ou

iii) une combinaison des deux catégories ci-dessus. La plupart des études relèvent de la première ou de la troisième catégorie.

B. Modèles migratoires

Les études récentes sur la migration ont surtout porté sur les facteurs déterminants de la migration, plutôt que sur les conséquences et effets externes de celle-ci (aussi bien pour la zone de départ que pour la zone d'arrivée). Or, l'examen de ces facteurs déterminants permet de constater que la théorie néoclassique de l'investissement dans le capital humain prédomine dans bon nombre des modèles migratoires. Selon cette théorie, la migration pourrait s'expliquer par des stimulants économiques comme les perspectives d'emploi, les différences de salaire ou d'autres variables liées au revenu. Dans les études les plus récentes, même les modèles gravitaires sont abordés sous l'angle du comportement, en termes de maximisation de l'utilité individuelle, puis modifiés de manière à inclure d'autre variables conformes à l'hypothèse néoclassique.

La plupart des études établissent une distinction entre la migration brute (origine et destination des migrants) et la migration nette (unidirectionnelle). Une méthode récente consiste à modéliser les probabilités de migration associées à une région donnée ainsi que le choix de la destination éventuelle. Les modèles de logit niché, qui examinent les paramètres du choix des individus, tiennent compte de cette méthode. La modélisation de la migration en deux étapes, comme c'est le cas dans le modèle de logit niché, permet de distinguer clairement les deux principaux facteurs qui influent sur la décision des migrants, soit le facteur d'incitation (répulsion de la zone de départ) et le facteur d'attirance (attraction de la zone d'arrivée).

Les caractéristiques des modèles varient considérablement, tant en ce qui a trait aux relations étudiées (modèle à équations uniques ou simultanées, ou modèle économétrique à grande échelle) qu'aux fondements théoriques, lesquels comprennent les modèles déterministes (statiques ou dynamiques) et stochastiques (modèle de logit niché). De récentes publications abordaient les questions de la modélisation d'équilibre par opposition à la modélisation de déséquilibre; de l'utilité des variables de cycle de vie pour expliquer la propension à la migration; et de la disponibilité des séries chronologiques et des microdonnées et leur utilisation dans les modèles migratoires. À la différence de l'hypothèse néoclassique, selon laquelle le déséquilibre entre les marchés de l'emploi constitue un facteur déterminant de la migration, les nouvelles approches mettent l'accent sur les questions d'agrément et supposent un équilibre du marché de l'emploi dans les diverses régions. Par

conséquent, les éléments tels que les salaires, les loyers et les autres différences de prix reflètent les inégalités régionales.

C. RÉSULTATS EMPIRIQUES

Le pouvoir explicatif d'une variable donnée semble dépendre des caractéristiques du modèle et du type de données utilisées aux fins de l'estimation. Par conséquent, la signification des variables (surtout des variables économiques) est équivoque. Si l'on tient compte de ce point, cependant, l'importance de facteurs tels que la croissance de l'emploi, la distance entre les régions, la taille de la population et les caractéristiques des individus (âge, scolarité, etc.), pour expliquer la migration interrégionale, semble uniforme d'une étude à l'autre.

Un point semble faire l'unanimité : la migration, à cause de son effet limité et du temps qu'elle met à réagir aux changements économiques, ne saurait, du moins à court terme, remplacer les politiques destinées à réduire les disparités régionales et à stimuler l'emploi.

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SUMMARY

A. Based upon their main emphasis, all migration models might be grouped as
those that focus on:

i) economic incentives (push and pull factors);

ii) non-economic (demographic or locational) factors; or

iii) a combination of (i) and (ii) above. Most studies fall either in the first or the third category.

B. Migration Models

Recent migration research has concentrated on the determinants of migration as opposed to the consequences and externalities of migration (both in the areas of origin and destination). After examining the determinants of migration models it was found that many of the models are dominated by the neo-classical theory of investment in human capital. This theory postulates that migration could be explained by economic incentives such as employment opportunities, wage differentials or other income variables. In most recent studies, even gravity models are given a behavioral content in terms of individual utility maximization and then modified to include other variables consistent with the neo-classical hypothesis.

Most studies make a distinction between gross and net migration to account for the single flow of migrants and the sum of unidirectional flows. Recent approaches emphasize modelling the probability of staying or leaving a particular region and the choice of destination. These approaches are captured in nested logit models that examine the choice parameters of individuals. Modelling migration as a two stage process, as in the nested logit model, highlights the distinction between the traditionally recognized "push" Uunattractiveness of origin and "pull" (attractiveness of destination) factors that influence migration decisions.

With regard to model specification, models vary both in the type of relationship they examine (single equation, simultaneous equations and large econometric models) and in their theoretical underpinnings deterministic : static, dynamic and probabilistic : nested logit models. Recent issues in the migration literature centre around the question of equilibrium versus disequilibrium modelling, the role of life-cycle variables in explaining the propensity to migrate, and the availability of time-series and microdata and their use in models of migration. In contrast to the neo-classical hypothesis which postulates labour market disequilibrium ás a determinant of migration, recent approaches emphasize amenity differences. The latter approach implies labour market equilibrium across regions and therefore wages, rent and other price differences reflect regional imbalances.

C. EMPIRICAL FINDINGS:

The explanatory power of a given variable seems to depend on the specification of the model and the type of data used in the estimation. As a result the significance and the expected sign of the variables, especially economic, is mixed. However, with this in mind, the importance of growth in employment, distance between regions, size of population and individual specific characteristics (age, education etc.) in explaining interregional migration seems consistent across various studies.

Due to its limited impact and slow response to differences in economic opportunities, there seems to be a consensus that migration cannot be a substitute for policies that aim at reducing regional disparities and employment creation, at least in the short-run.

Annotated Bibliography

Ahamad, Bill and Robin Rowley. **A REPORT ON A MODEL FOR MAKING PROJECTIONS OF INTERPROVINCIAL MIGRATION FLOWS IN AGGREGATE AND BY OCCUPATION**, *C.O.P.S.-Consultant Report*, Ottawa: Employment and Immigration Canada, 1986.

This study is an attempt to model interprovincial migration in order to make population projections for each province. The projections are further disaggregated by occupational groups to ascertain labour demand and supply for each province. Using annual data derived from taxation statistics, the model estimates a modified gravity model. The model includes differences in unemployment rate, employment/labour force ratio and relative earnings as explanatory variables. The empirical results indicate that the most important factors determining interprovincial migration are: population size in the receiving and sending regions, distance, in-migration and out-migration in the previous year. The significance of economic factors in explaining migration flows was limited. The study concludes that based on the fit of the estimated equations, the models look promising to serve as projection tools.

Blanco, Cicely. **"The Determinants of Interstate Population Movements"**, *JOURNAL OF REGIONAL SCIENCE*, 5(1), 1963, PP. 77-84.

The study used a standard (OLS) model to examine factors determining interstate population movements in the U.S. Using U.S. migration data for 1950-57, the study examined the importance of economic and non-economic variables in explaining interstate migration. According to its findings, changes in the level of unemployment in each state explained eighty-five per cent of the variations in the regional rate of total civilian migration. Regional differences in the degree of racial prejudice, education, wage level or climate, however, failed to have a direct influence on the rate of interstate migration.

Boehm, Thomas P. et al. **"Intra-Urban Mobility, Migration, And Tenure Choice"**, *THE REVIEW OF ECONOMICS AND STATISTICS*, LXXIII (1), 1991, PP. 59-68.

Boehm et al examined the interdependence between the decision to move within an urban area or to migrate, and the households' tenure (own/rent) choice. The study used a logit model to analyze the relationships between household mobility and urban housing choice. It concludes that future mobility and current tenure choice are jointly determined. The study also found that decomposing mobility into its intra-urban and migration components indicates an interdependent relationship between the two. The novelty of the approach lies on modelling migration and

intra-urban mobility and tenure choice as a joint household decision.

Clark, David E. and Cosgrove, James C. **"Amenities Versus Labor Market Opportunities: Choosing the Optimal Distance to Move"**, *JOURNAL OF REGIONAL SCIENCE*, 31 (3), 1991, PP. 311-328.

This article "mediates" between the contrasting approaches of equilibrium and disequilibrium in examining the determinants of migration. It focuses on the relative significance of the human-capital theory of migration, which emphasizes disequilibrium in the labor market, and the recent equilibrium approach, which concentrates on the variation in amenities in explaining migration flows. After conducting separate tests, controlling the influence of the alternative hypothesis, the study concludes that both economic factors (disequilibrium hypothesis) and amenities (equilibrium approach) are significant factors in explaining regional migration. The study used U.S. microdata for 1975 and 1980.

Cushing, Brian J. **"A Note on Specification of Climate Variables in Models of Population Migration"**, *JOURNAL OF REGIONAL SCIENCE*, 27(4), 1987, PP. 641-648.

Based on the hypothesis that quality of life influences patterns of migration, this study examines different specifications using temperature variables. Statistical tests for nested and non-nested hypotheses are used to compare and choose among possible specifications. The empirical results suggest that of all the climate specifications considered, using average January and July temperatures is superior to that of using simple average annual temperatures. The study also found that migrants are drawn to moderate temperatures and are repulsed by either too hot or too cold a climate.

DaVanzo, Julie. **"Does Unemployment Affect Migration - Evidence from Micro data"**, *THE REVIEW OF ECONOMICS AND STATISTICS*, LX(4), 1978, PP. 504-514.

DaVanzo analyzed the effects of unemployment and job search on the propensity to migrate. The study used longitudinal data to estimate a simultaneous equations system with the unemployment rate and the level of job search as the main determinants of interregional migration. The specific hypothesis tested is whether or not families whose heads are unemployed or claim to be looking for a different job are more likely to migrate than families whose heads are not looking for work. Similarly, whether those unemployed are more likely to migrate than those employed. DaVanzo reports that the results of the study support the hypotheses. That is, without any policy influence those

unemployed and looking for a different job are more likely to migrate than those who are not actively looking for work.

DeVortez, Don J. **ECONOMIC OF IMMIGRATION: AN ANNOTATED BIBLIOGRAPHY CIRCA, 1977-1987,** *Vancouver: Simon Fraser University, Department of Economics,* Nov. 20, 1988.

This is a survey of studies on the economics of immigration undertaken between 1977 and 1987. The survey excludes any studies that appear in the Journal of Economic Literature over the time period. The paper focuses on studies related to the labour market (labour substitution and capital complementarity), the capital asset market including remittances and human capital inflows, the effect of immigrants on aggregate consumption and savings patterns, and the effect of immigrants on public finance issues.

Dierx, Adriaan H. **"Estimation of A Human Capital Model of Migration",** *ANNALS OF REGIONAL SCIENCE*, NOV. 1988, PP. 99-110.

This study develops a model based on the human capital theory of migration with distinct life cycle variables. The estimated model incorporates: (1) an index of characteristics that uniquely define a specific location; and (2) a location specific theory of human capital. The empirical results suggest that an increase in the family head's endowment of non-specific human capital will increase the probability of migration, while an increase in the head's stock of location specific human capital implies a lower migration probability. The main contribution of the study lies in its specific treatment of life cycle variables.

Economic Council of Canada, **NEW FACES IN THE CROWD: ECONOMIC AND SOCIAL IMPACTS OF IMMIGRATION,** A Statement by the Economic Council of Canada, Ottawa: Ministry of Supply and Services, 1991.

This is a summary of the size, composition and patterns of settlement of new immigrants to Canada designed to help policy makers. It examines the economic and social impacts of immigration both at the national and the provincial levels. Specifically, it outlines the impacts of immigration on efficiency gains, tax and dependency rates, employment and unemployment and the social consequences associated with immigration. It examines these and other impacts under three scenarios of immigration policy. Within the context of existing government immigration policy, it evaluates the merit of each policy issue with respect to size and type of immigrant groups.

Evans, Alan W. **"The Assumption of Equilibrium in the Analysis of Migration and Interregional Differences: A Review of some Recent**

Research", *JOURNAL OF REGIONAL SCIENCE*, 30 (4), 1990, PP. 515-531.

This paper surveys the recent migration literature that discusses equilibrium/disequilibrium assumptions in the context of location specific amenities. The survey highlights the issues involved in assuming interregional labour market equilibrium in the presence of net migration. The validity of the equilibrium assumption is examined based on previous empirical results and on its theoretical implications about the valuation of amenities as reflected in regional wage rate, rent and other prices. The study concludes that the assumption of equilibrium cannot be sustained given the persistent migration between regions.

Fields, Gary S. **"Place-To-Place Migration: Some New Evidence"**, *THE REVIEW OF ECONOMICS AND STATISTICS*, VOL. 61, 1979, PP. 21-32.

The study tests the determinants of migration in the context of investment in human capital. The variables used for estimation include: real income; measures of turnover in the labour market; actual and average distance between regions; the cost of moving; and size of population. The study used the 1970 U.S. census data to estimate the model. Within the context of logistic model specification (separating departure and destination variables), the model chosen for estimation is double logarithmic. The results are reported to have supported the usefulness of the human investment approach and the choice of the functional form.

Foot, David K and William J. Milne. **NET MIGRATION ESTIMATION IN AN EXTENDED, MULTIREGIONAL GRAVITY MODEL**, *Institute for Policy Analysis*, University of Toronto, Working Paper No. 8212, 1982.

Using a modified gravity model with the adding-up constraint (net migration across provinces equals zero), the authors examine the significance of pull and push factors in explaining interregional net migration in Canada. They used annual data covering the period 1961 to 1979 for all ten Canadian provinces. The method of estimation used is 'Constrained Seemingly Unrelated Regression (SUR)' technique which the authors argue is appropriate in such cases. The empirical results suggest that the model performed exceptionally well especially with respect to variables that showed mixed results in previous studies (e.g. unemployment rate).

Gauthier, Denis. **SOME ECONOMIC ASPECTS OF INTERNAL MIGRATION: NEWFOUNDLAND'S CASE,** *Ottawa: Economic Council of Canada,* Discussion Paper No. 178, 1980.

This study examines the number and characteristics of returning migrants to Newfoundland. Using 1971 Census data, it analyzes the socio-economic characteristics of various migrant and non-migrant groups in the province and it compares the labour market performance of each group. The role of differences in levels of education, age and sex on the relative performance of each migrant group in the labour market is also examined based on the same data. Labour market performance is measured by employment status and relative income by levels of education, age, and sex. Except for income determination of each sub-group, the author used descriptive analysis in the study.

Goss, Ernest and Hui S. Chang. **"Changes in Elasticities of Interstate Migration: Implication of Alternative Functional Forms",** *JOURNAL OF REGIONAL SCIENCE*, 23(2), 1983, PP. 223-232.

The focus of this study is on establishing the appropriate functional form for estimating interstate migration. The paper argues that using linear, log-linear, semi-log, reciprocal, or log-reciprocal functional forms introduce specification errors. Based on conformance of sign expectations, significance of coefficients and effect on elasticities, the paper argues that the general form specification is superior to all the others. The procedure relies on the transformation of variables methodology and on using maximum likelihood method to estimate the parameters of the general form specification. Comparison of empirical results obtained estimating the above functional forms is reported to have confirmed the superiority of the suggested functional form.

Grant, E. Kenneth and John Vanderkamp. **THE ECONOMIC CAUSES AND EFFECTS OF MIGRATION: CANADA, 1965 - 71,** *Economic Council of Canada.* Ottawa: Ministry of Supply and Services, 1976.

In this study the authors examine the direct impacts on interprovincial migration of interregional income differentials and employment levels. At the same time the indirect effect of cultural differences and its effect on interprovincial migration was investigated. The study also examines the role of migration in reducing such differences in the context of the neo-classical market adjustment theory. The authors carried out their study using the Unemployment Insurance data base (social insurance, contributions, benefit, and tax records) and a probabilistic model. The results of the study suggest that migration does not eliminate regional economic disparities, especially in the short

term. On the other hand, without migration regional economic disparities would be worse than they are now.

Graves, Philip E. **"Migration With A Composite Amenity: The Role of Rents"**, *JOURNAL OF REGIONAL SCIENCE*, 23 (4), 1983, PP. 541-546.

The paper analyzes migration with the implicit assumption of inter-regional equilibrium holding. Consequently, variations in income across regions represent compensation for amenities. Furthermore, due to the endless number of possible location specific characteristics, the study uses rent as a proxy for the unpriced amenities of a region. The long list of amenities and the correlation between them imposes a choice between imprecisely estimated amenity impacts and omitted variable bias. Based on the empirical results, this modelling approach is reported to have the advantages of allowing greater degrees of freedom, reducing omitted variable bias, and reducing the loss of precision.

Graves, Philip E. and Peter D. Linneman. **"Household Migration: Theoretical and Empirical Results"**, *JOURNAL OF URBAN ECONOMICS*, VOL. 6, 1979, PP. 383-404.

In this study migration is analyzed using the standard demand approach. The authors classify goods as those traded and non-traded (amenities) between areas. A change, say, in income will imply an increase in demand for non-traded goods, and hence an increase in migration to areas with such amenities as climate or location characteristics. They tested their hypotheses using cross-sectional data and a nonlinear maximum likelihood (probit) regression analysis. The results are reported to have supported both the hypotheses and the model specification.

Greenwood, Michael J. **"Research on Internal Migration in the United States: A Survey"**, *JOURNAL OF ECONOMIC LITERATURE*, 24 (4), 1975, PP. 397-433.

This article is a survey of migration research carried out since the early sixties. The review is limited to studies within the field of economics, and focuses on the determinants and consequences of migration. In the studies reviewed, factors determining migration included: the distance between regions; the related psychic cost of moving; expected net benefit (income) at the area of destination; availability of information; and individual specific demographic characteristics such as age and level of education. Owing to the complexity of modelling and the lack of data, little research has been focused on the consequences of migration. The paper summarizes the attempts made to fill this gap. This includes the application of simultaneous equations to model both the determinants and the consequences of migration. Among the issues investigated in relation to the

consequences of migration are the efficiency of the market mechanism in redistributing labour resources, and the externalities associated with migration.

..... **"Human Migration: Theory, Models, and Empirical Studies"**, *JOURNAL OF REGIONAL SCIENCE*, 25 (4), 1985, PP. 521-544.

In this article Greenwood looks at theoretical underpinnings, modelling and other developments in the literature of internal migration since his earlier survey of a decade before. He summarizes the theoretical refinements and advances in modeling over the decade. With regard to determinants of migration," (1) emphasis [is placed] on family and life-cycle aspects of the migration decision and (2) the application of equilibrium as opposed to disequilibrium ... analysis," are noted as recent important developments. Such approaches are made possible by the availability of new microdata bases. The article reviews the theoretical and empirical contributions of various studies that used microdata bases in their investigations. Another notable development discussed in analyzing both the determinants and consequences of migration, is the use of time-series data as opposed to the previously predominant use of cross-section data of previous studies.

Greenwood, Michael J. and Gary L. Hunt. **"Econometrically Accounting For Identities And Restrictions in Models of Interregional Migration"**, *REGIONAL SCIENCE AND URBAN ECONOMICS*, VOL. 14, 1984, PP. 113-128.

The objective of this study is to demonstrate a method of accounting for interregional demographic identities and other restrictions (e.g. adding-up restrictions) in a multi-equation, linear model of interregional migration. The study highlights the problems encountered in using such models in the absence of ample time-series observations, as is usually the case with migration data. Such limitations result, among other things, in a lack of enough degrees of freedom in estimating equations.

..... **"Jobs Versus Amenities in the Analysis of Metropolitan Migration"**, *JOURNAL OF URBAN ECONOMICS*, VOL. 25, 1989, PP. 1-16.

In contrast to Graves (1983) emphasis on amenities in explaining net metropolitan migration, this study focuses on the significance of employment and income variables in explaining migration. The study indicates that the direct effects of jobs and wages are considerably more important than the direct effects of location-specific amenities in explaining net metropolitan migration of employed persons. Having emphasized the significant contributions of economic variables to metropolitan migration, the authors concede that location-specific amenities may also be

important to the extent that the value of the amenities are capitalized in wages and rents.

Greenwood, Michael J., Gary L. Hunt, and John M. McDowell. **"Migration And Employment On The Spatial And Temporal Dimensions Of The Linkage"**, *JOURNAL OF REGIONAL SCIENCE*, 26 (2), 1986, PP. 223-234.

This paper examines the interaction of employment creation and the flow of net migration. Using a unique data set, it analyzes to what extent job creation attracts new migrants and how these migrants help create new jobs in the area of their destination. The study reports that "during an average year, two more jobs directly attract approximately one additional employed migrant, and in approximately half the years an additional employed migrant has a direct employment effect of one job".

Greenwood, Michael J. and John M. McDowell. **"The Factor Market Consequences of U.S. Immigration"**, *JOURNAL OF ECONOMIC LITERATURE*, VOL. XXIV, DEC. 1986, PP. 1738-1772.

This paper surveys the issues and the empirical findings related to the impact of migrants on the U.S. labour market. Beginning with the volume and the composition of immigrants to the U.S. since the 1970s, it examines, among other things, the impact on domestic wage and employment, transferability of migrant skills and the success or failure of migrants in the U.S. labour market. The paper also includes an extensive summary and references based on a detailed survey of the literature.

Harkman, Anders. **"Migration Behavior among the Unemployed And The Role Of Unemployment Benefits"**, *PAPERS OF THE REGIONAL SCIENCE ASSOCIATION*, VOL. 66, 1989, PP. 143-150.

This study analyzes the migration behavior of young unemployed persons in Sweden. It attempts to distinguish between migration that is motivated by economic and non-economic factors among such groups. In addition to investigating the economic factors determining migration, it specifically examines the impact of unemployment benefits on the propensity to migrate. The results of the study indicate that out of the 10 per cent total migrants, only 4.4 per cent of them migrated for economic reasons, while more than half of them were more motivated by non-economic considerations. The study also found that unemployment benefits has a strong negative effect on labour market motivated migration.

Isserman, Andrew M. et al. **"Forecasting Interstate Migration With Limited Data: A Demographic-Economic Approach"**, *JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION*, 80 (390), 1985, PP. 277-285.

The method of analysis outlined in this paper combines demographic, economic and geographic approaches to forecasting interstate migration. The purpose of the approach is to overcome the limitations imposed by lack of migration data to time-series modelling of interstate migration.

Judson, D. H. **"Human Migration Decision Making: A Formal Model"**, *Behavioural Science*, Vol. 35, 1990, pp. 281-289.

This paper outlines models of human migration within a framework of decision theory. It focuses on the importance of specifying the appropriate decision process in determining independent variables. It emphasizes that, among other things, the random component of such a decision has to be taken into account in specifying models of migration.

Kahley, William J. **"Population Migration in the United States: A Survey of Research"**, *FEDERAL RESERVE BANK OF ATLANTA ECONOMIC REVIEW*, JAN./FEB. 1991, PP. 12-21.

Kahley surveys, in some detail, the relevant theories of migration, the main findings of previous empirical research and outlines some of the unresolved issues to date. In addition to the review of the literature, the paper reports the author's empirical investigation dealing with some of the unresolved issues. The paper attempts to emphasize the link between migration and its policy implications to regional growth.

Knapp, Thomas A. and Philip E. Graves. **"On the Role of Amenities in Models of Migration and Regional Development"**, *JOURNAL OF REGIONAL SCIENCE*, 29 (1), 1989, PP. 71-87.

This article explores different approaches in the context of recent attempts to examine the role of location-specific amenities in human migration. By drawing on recent literature, it presents a theoretical structure for analyzing demand and supply factors as determinants of migration. The thrust of the analysis hinges on the assumption that the value of location-specific amenities is 'capitalized into wages, rents, or other local prices'.

Krumm, Rondld J. **"Regional Labor Markets and the Household Migration Decision"**, *JOURNAL OF REGIONAL SCIENCE*, 23 (3), 1983, PP. 361-376.

This paper investigates, using a log likelihood function and panel data from the U.S., the influence of location-specific amenities on migration decision and how these influences are related to regional wage differentials. It attempts to examine the hypothesis that 'migration and job change decision depends on

initial location as well as household specific variables'. The empirical support for this hypothesis is used to shed some light on whether regional wage rates are in equilibrium or disequilibrium and on the magnitude of wage loses or gains associated with mobility.

Ledent, J and Kao-Lee Liaw. **INTERPROVINCIAL MIGRATION OUTFLOWS IN CANADA, 1961-1983: CHARACTERIZATION AND EXPLANATION.** *Q.S.E.P. Research Report No. 141.* McMaster University, Hamilton: Ontario, 1985.

This study examines the propensity to out migrate and the destination choice pattern of migrants in Canada. Based on annual time-series data and a nested logit model, the paper investigates determinants of interprovincial migration. To account for the two-level choice process, the study used distinct origin and destination variables at the provincial and national levels. The important findings of the study are summarized as follows: the propensity to out migrate shows no clear trend (up or down). However, it "exhibits large spatial and temporal variations" that depend on origin variables such as provincial population share, cultural attachment, and wage as well as national variables (e.g. wage and unemployment rate). The destination choice pattern, on the other hand, indicates significant changes and is influenced by stable factors such as temperature (degree of harsh weather:coldness), distance and ethnic dissimilarity and by changeable factors like wage and unemployment benefit.

Lianos, Theodore P. **"The Migration Process and Time Lags"**, *JOURNAL OF REGIONAL SCIENCE*, 12 (3), 1972, PP. 425-433.

The objective of this paper is to test the hypothesis that formulating the basic migration model (human capital theory) as a stock, changes the model from a static to dynamic approach and subsequently improves its performance. Accordingly, the study develops a dynamic model and compares its performance with a static version of the same model using Greek migration data to Canada, Australia, the U.S. and Germany. The empirical results indicate that the dynamic model performs better than the static models as hypothesized.

Liaw, Kao-Lee and Jacques Ledent. **"Nested Logit Model and Maximum Quasi-Likelihood Method: A Flexible Methodology for Analyzing Interregional Migration Patterns"**, *REGIONAL SCIENCE AND URBAN ECONOMICS*, VOL. 17, 1987, PP. 67-88.

This paper develops a nested logit model for analyzing interregional migration and tests the model using Canadian time-series data. Focusing on push and pull economic and non-economic factors, it examines to what extent migration serves to equalize economic opportunities between regions in Canada. The

empirical results support "pull" factors, and indicate that migrants choose a region with 'a high wage rate, rapid employment growth, and low unemployment' as their destination. The push economic factors, on the other hand, were not as significant as expected, suggesting the failure of migration in reducing economic disparity (income differentials) between regions.

Liaw, K-L. **"Neutral Migration Process and Its Application to An Analysis of Canadian Migration Data"**, *ENVIRONMENT AND PLANNING*, VOL. 22, 1990, PP. 333-343.

This article examines whether the decision to migrate is dominated by pull factors (attractiveness of destination) or push factors (unattractiveness of origin). To determine the proportion of the two factors, a measure of a neutral migration process is introduced via a methodology similar to a two-way analysis of variance. Using 1976-81 Canadian intercensal data, it investigates the interprovincial migration patterns of young (aged 20-24) and elderly (65+) Canadians. The results of the study indicate that despite their being at different stages of the life cycle, the propensity to migrate for both age groups is dominated by destination rather than a departure choice process.

Marr, William L. and Douglas McCready. **THE EXPENDITURE PATTERNS OF THE CANADIAN-BORN AND THE FOREIGN-BORN IN CANADA.** *School of Business and Economics, Wilfrid Laurier University*, Waterloo: Ontario, Research Report #8691, 1982.

This study compares the consumer expenditure patterns of Canadian-born individuals with those Canadians born outside of Canada. The major expenditure categories examined include: food, shelter, clothing, household, transport and education. The analysis is based on the 1982 survey of Family Expenditure carried out by Statistics Canada. The authors calculated the average and the marginal propensity to consume of each group using descriptive and regression analysis, respectively. Their results suggest that for both groups, the major expenditure items are food, shelter and transport. However, differences exist between the groups in terms of their allocation of income to the different consumer expenditure categories. The foreign-born Canadian spends 17.9% and 21.5% of income respectively on food and shelter, while the percentages for the Canadian-born are 17.3% and 20%, respectively. For most of the expenditure categories (clothing, recreation, tobacco products and alcoholic beverages), the Canadian born allocates a significantly higher proportion of their income than does the foreign-born.

Mead, Arthur C. **"A Simultaneous Equations Model of Migration and Economic Change in Nonmetropolitan Areas"**, *JOURNAL OF REGIONAL SCIENCE*, 22 (4), 1982, PP. 513-527.

In this article, Mead analyzes the interdependence between migration and employment growth based on cross-section data of 69 non-metropolitan regions in the U.S for the period 1960-1970. The article specifies a simultaneous equations model with in-migration, out-migration, growth in employment and growth in income as dependent variables. According to the results of the empirical estimation, 'migration was found to affect and be affected by both income and employment growth'. The study, therefore, reports to have found support for the interdependence between demographic and economic changes in non-metrcpolitan areas, consistent with the pull and push models of migration.

Milne, William J. **MIGRATION MODELING IN AN INTERREGIONAL MACROECONOMETRIC MODEL OF THE CENSUS REGIONS,** *Toronto: Institute for Policy Analysis, University of Toronto*, Working Paper No. 8110, 1981.

This paper deals with the specification and estimation of an internal migration model in conjunction with a multiregion macroeconometric system of U.S. census regions. The model employs the standard economic variables (wage rate, unemployment rate and population density) for explaining net interregional migration. Milne notes that due to its size and flexibility, the model is capable of incorporating other variants of migration hypotheses with different variables. The study includes population projections for each region based on the simulation experiments of the model.

Milne, W. J., D. K. Foot, and D. P. Dungan. **"Migration in an Economic-Demographic Model For the Canadian Provinces",** *ENVIRONMENT AND PLANNING* , VOL. 17, 1985, PP. 1185-1200.

The article presents a model incorporating economic-demographic variables to examine interprovincial migration in Canada. The objective of the article is to demonstrate that modelling migration flows as interactions between demographic and economic factors, allow variables from the economic model (for example, wage and unemployment rates) to influence the source population, the labour force and, ultimately, the unemployment rate. The demographic model is specified under the human capital approach and net migration that includes the 'adding-up' restriction such that the sum of net migration flows across provinces is zero. Based on this model the authors consider the impact of various policy changes on the regional economy using simulation techniques. The performance of the model indicates the usefulness of the approach in showing the interactions between economic activity and demography.

Molho, Ian. **"A Dynamic Model of Interregional Migration Flows In Great Britain",** *JOURNAL OF REGIONAL SCIENCE,* 24 (3), 1984, PP. 317-337.

Within a framework of investment in human capital, a dynamic model of interregional migration is constructed using time-series data for the regions of Great Britain. The rationale for this modelling approach is that risk, expectations formation and adjustment cost play such a role that the decision to migrate is a dynamic process involving response lags. The model is estimated using regional push and pull factors by separating the influences of national variables and distance. The results suggest lengthy and important lags in the estimated relationships which may not be captured by cross-sectional models. For instance, the results indicate that while the rate of unemployment significantly affects the flow of migration in the short-run, the rate of growth of employment is the most important determinant of economic related migration in the long-run.

Moore, E. G. and et al. **THE REDISTRIBUTION OF IMMIGRANTS IN CANADA**, *A Report prepared for Employment and Immigration Canada*, May 1990.

In this report the authors examine the migration behavior of early immigrant groups and the redistribution of recent migrants in Canada. Based on the 1981 and 1986 census data, they analyze (using descriptive statistics) the overall patterns of interregional migration and that of specific immigrant groups in Canada. Their findings include: (1) immigrants (particularly new immigrants) respond more to changes in "regional economic conditions than the Canadian-born population of a similar age", (2) Metropolitan Toronto attracted more new immigrants, particularly those from Asia and the Carribean, than any area during the 1981-86 period; an immigrant was about two to three times more likely to move to Toronto than a Canadian-born during this period; and (3) though in many cases compensated by the arrival of new immigrants, relatively more immigrants move out of Quebec (outside of Montreal) and the Atlantic provinces during the same 1981-86 time period.

Nelson, Michael A. and Michael L. Wyzan. **"Public Policy, Local Labor Demand, and Migration in Sweden, 1979-84"**, *JOURNAL OF REGIONAL SCIENCE*, 29 (2), PP. 247-264.

This study attempts to investigate the impact of fiscal and traditional market variables on inter-county and inter-municipality migration in Sweden. The study used a single equation model and cross-section data at the county and municipality levels for the period 1979-84. The results suggest that taxes negatively affect in-migration to a county but at the municipality level the result is not conclusive. Similarly, budget expenditures to subsidize migration were not effective in stimulating migration, while destination wages had a positive impact on migration at the municipality level.

Pissarides, Christopher A., and Ian McMaster. **"Regional Migration, Wages and Unemployment: Empirical Evidence and Implications for Policy"**, *OXFORD ECONOMIC PAPERS*, VOL. 42, 1990, PP. 812-831.

This paper examines three main issues: (1) the response of migration to the rates of regional wage and unemployment differentials; (2) in the presence of migration, the extent to which regional wage and unemployment differentials compensate each other (wage and employment trade-off); and (3) the implications of these adjustments for regional economic policy. Regression analysis is carried out using time-series data covering the period 1961-82 for nine regions of Great Britain. The empirical findings suggest that net migration responds to differences in regional wage growth (not to the level of relative wage) and to differences in employment opportunities.

Rogerson, P. A. **"Migration Analysis Using Data With Time Intervals of Differing Widths"**, *PAPERS OF THE REGIONAL SCIENCE ASSOCIATION*, VOL. 68, 1990, PP. 97-106.

This paper is concerned with the usage of data in analyzing human migration. It outlines the implications of using data with different time intervals, say one or five years. It argues that the choice of data must be consistent with patterns of return migration and heterogeneity in migration. Failure to take into account the length of time period for which the data is collected will affect the magnitude and the interpretation of results, in particular multi-regional population projections.

Rogerson, P. and R. D. MacKinnon. **"Interregional Migration Models with Source and Interaction Information"**, *ENVIRONMENT AND PLANNING A*, 14 (4), 1982, PP. 445-454.

This article deals with the role of information in the process of making migration decisions. The paper presents a theoretical argument about how diffusion of information plays an important role in models of migration. It identifies two sources of information: directly from employers and agencies (source information) and indirectly from friends and relatives (interaction information). Potential migrants are assumed to evaluate the information they gathered from these sources and then, based on all the information received, react to the relative attractiveness of destinations.

Rosenbluth, Gideon. **THE CAUSES AND CONSEQUENCES OF INTERPROVINCIAL MIGRATION,** *Vancouver: UBC, Department of Economics, Discussion Paper #87-29,* August, 1987.

This study uses a simultaneous equation model to examine many items namely: factors affecting regional migration; the impact of

migration on the regional wage rate; and the policy implications of such effects. The basic assumption of the study is that migrants move from one region to another so as to maximize perceived net benefits of migration. The models are estimated using annual data (1966-83) of seven Canadian regions. Based on the estimated results and simulation exercise, the author suggests that the impact of migration in equilibrating interregional labour market conditions is limited and indicates a significant lag. The policy implication of this result is that employment creating policies may be required, at least in the short-term, to reduce regional unemployment and to eliminate regional disparities in general.

Salvatore, Dominick, **"An Econometric Analysis of Internal Migration in Italy"**, *JOURNAL OF REGIONAL SCIENCE*, 17 (3), 1977, PP. 395-408.

The thesis of this study is that employment opportunities as reflected in lower expected unemployment rates and earnings as echoed in expected real wage rates explain inter-regional migration. Using a static and dynamic model and time-series data, the study examined interregional migration in Italy. Based on the econometric results, the study concludes that internal (South to North) migration in Italy can be "viewed primarily as a response to interregional unemployment and earning differentials". The results of the study suggest that the problem of multicollinearity is reduced when net migration is specified in terms of earning and unemployment differentials so as to not lose degrees of freedom.

..... **"An Econometric Model of Internal Migration and Development: Extensions and Tests"**, *REGIONAL SCIENCE & URBAN ECONOMICS*, 14 (1), 1984, PP. 77-87.

This study is an extension of Salvatore's 1977 study regarding the determinants of internal migration in Italy. In his earlier work, the author examined the role of regional economic differentials (focusing on employment opportunities) on the propensity to migrate. In this paper, the author tests the stability of his original model and its coefficients using extended time-series data (from 1958-76 to 1958-81). The study concludes that the model is stable and its coefficients are consistent with the results of the original study.

Schachter, Joseph and Paul G. Althaus. **"An Equilibrium Model of Gross Migration"**, *JOURNAL OF REGIONAL SCIENCE*, 29 (2), 1989, PP. 143-159.

In contrast to conventional (neo-classical) models of migration which assume regional disequilibrium, this study assumes equilibrium across regions. As a result migration is a response to "variations in the level of amenities, governmental services,

taxes...". To test this hypothesis, the study used a cross-section of U.S. regional data for 1975-1980 and a two-stage least square model. Based on the empirical results of the model the study compares whether the evidence supports the equilibrium or the disequilibrium approach. The authors conclude that, "the evidence is consistent with the equilibrium model but inconsistent with the conventional migration model, which suggest that our model should be the basis for future research".

Silvers, Arthur L. **"Probabilistic Income-Maximizing Behavior in Regional Migration"**, *INTERNATIONAL REGIONAL REVIEW*, 2 (1), 1977, PP. 29-39.

This paper deals with the problems encountered in estimating a migration model in the context of a neoclassical hypothesis. According to Silvers, Such models indicate, "in evident contradiction of economic logic, labour too frequently migrates to other than the 'net-returns' maximizing region". Such results cast doubt on the importance of interregional wage differentials as a motive for individual migration. Silvers argues that such an unexpected result is due to the deterministic formulation of the neo-classical model which lead to estimation bias emanating from problems of aggregation and identification. To overcome these problems, the article suggests a probabilistic approach in formulating the individual migration decision process. Accordingly the article presents a theoretical model of such an approach.

The United Nations, **MANUALS ON METHODS OF ESTIMATING POPULATION: METHODS OF MEASURING INTERNAL MIGRATION**, MANUAL VI, Population Studies NO. 47. New York: United Nations, 1970.

This study presents comprehensive guidelines in measuring the basic concepts of migration theory - more specifically internal migration. It outlines a survey of measures that are and must be used in applying the basic concepts and the data that is consistent with such concepts and measures. To highlight the suggested measures it uses examples from different countries.

Winer, Stanley and Denis Gauthier. **INTERNAL MIGRATION AND FISCAL STRUCTURE: AN ECONOMETRIC STUDY OF THE DETERMINANTS OF INTERPROVINCIAL MIGRATION IN CANADA.** Ottawa: Supply and Services Canada, 1982.

This study investigates the impact of direct and indirect government payments on interprovincial migration in Canada. The important fiscal influences examined include regional unemployment insurance transfers and equalization payments. The authors used two migration data sets to estimate a multinomial logit econometric model. The first data set is constructed from family allowance and the other from federal income tax files. The

estimation results, especially those based on migration data, suggest that the fiscal influences are generally mixed. Fiscal influences were important, however, for low income earners in the Atlantic provinces to out-migrate to Alberta and B.C. in search of economic opportunities between 1968-78.

Wrage, Peter. **"The Effects of Internal Migration on Regional Wage and Unemployment Disparities In Canada"**, *JOURNAL OF REGIONAL SCIENCE*, 21 (1), 1981, PP. 51-63.

This study attempts to test the role of migration in narrowing earnings and unemployment differentials among economic regions in Canada according to the edicts of neo-classical theory. Using pooled cross-sectional and time-series data for 1960-71 the hypothesis is estimated via an ordinary least square (OLS) technique. The empirical results suggest that both immigration and internal migration tend to reduce growth of wages as expected. However, the negative effects are too small to serve a policy of narrowing regional earnings gap. The author concludes, "as an earnings adjustment mechanism, migration simply does not work very well in Canada".

APPENDIX A - SUMMARY OF RELEVANT STUDIES

PAPER / AUTHOR	MODEL TYPE		MODEL ORIENTATION		DATA TYPE		Variables / Determinants
	Socio-Economic	Modified-Gravity	Policy-Analysis	Forecasting Simulation	Time-Series	Cross-Section	
1. Ahamad, Bill and Robin Rowley		X				X	a,b,c,g,j
2. Blanco, Cicely	X		X			X	a,b,c,j
3. Boehm, Thomas P. et al	X					X2	a,b,d,j
4. Clark, D. E. and J. C. Cosgrove		X	X			X2	a,b,c,d,e,f,g h,j
5. DaVanzo, Julie	X		X			X2	a,b,g
6. Economic Council of Canada	X		X	X	X		a,c,h,j
7. Fields, Gary S.	X		X			X	a,b,c,g,i
8. Foot, D. K and W. J. Milne		X			X		a,b,c
9. Grant, E. K. and J. Vanderkamp		X	X			X2	a,b,c,g,i,j
10. Graves, P. S.	X1		X			X	a,b,d,e,j
11. Graves, P. E. and P. D. Linneman	X					X2	a,b,j
12. Greenwood, M. and Garry L. Hunt	X				X		a,b,e,f,h
13. Greenwood,M.,G.Hunt & J. McDowell	X		X		X		a,b
14. Harkman, Anders	X					X	a,b,i,j
15. Isserman, A. et al	X	X		X		X	a,b,c,e,g,j
16. Kahley, W. J.	X		X		X		a,b,e,i
17. Krumm, R.J.	X					X2	a,b,e,j

SUMMARY OF RELEVANT STUDIES (cont.)

PAPER / AUTHOR	MODEL TYPE		MODEL ORIENTATION		DATA TYPE		Variables / Determinants
	Socio-Economic	Modified-Gravity	Policy-Analysis	Forecasting Simulation	Time-Series	Cross-Section	
18. Ledent, J. and K-L Liaw	X				X		a,b,c,e,f,g,h i,j
19. Liaw, K-L and J. Ledent	X		X		X		a,b,c,e,h,i,j
20. Mead, A. C.	X		X		X		a,b,g,i,j
21. Milne, W. J.	X		X	X	X		a,b,c,g,i,j
22. Milne, W. J. and D. P. Foot	X		X	X	X		a,b,c,i
23. Molho, I.	X		X		X		a,b,c,d,e,f,g
24. Moore, E. G. et al	X		X			X	a,b,c,h,i,j
25. Nelson, M. A. and M. L. Wyzan	X		X			X	a,b,i,j
26. Pissarides, C.A. and J. McMaster	X		X		X		a,b,c
27. Rosenbluth, G.	X		X	X	X		a,b,c,j
28. Salvadore, D.	X		X	X	X		a,b,
29. Schachter, J. and P. G. Althaus	X					X	a,b,c,e,f,i,j
30. Winer, S. L. and G. Denis	X		X	X	X		a,b,c,i,j
31. Wrage, P.	X		X			X2	a,b

LEGENDS: X1 = amenities X2 = microdata
a = wage / wage differentials
b = employment / unemployment
c = population
d = price of housing
e = location preference / relocation costs
f = climate
g = distance
h = cultural attractiveness
i = transfers / subsidies
j = occupation / age composition

APPENDIX B
MODELS OF MIGRATION: SOME EXAMPLES

1. Milne, Foot, Dungan

   a) Thesis: Modelling migration flows as interactions between demographic-economic factors allow for variables from the economic model (wage rate and unemployment rates) to influence the source population, the labour force and, therefore, the unemployment rate.

   b) Model:

   $$Mi = f(Wi, Wj, Ui, Uj, Pi, Pj)$$

   Wi,j = wage in i and j
   Ui,j = unemployment in i and j
   Pi,j = population in i and j
   $i,j = 1,2, \ldots n$ regions

   C) Model Features:
   i) economic-demographic
   ii) simulation and forecast
   iii) multi-regional

2. Salvatore, D.

   a) Thesis: Employment opportunities as reflected in lower expected unemployment rates and earnings as reflected in expected real wage rates explain inter-regional migration.

   b) Model:

   $$Mijt = f(Uit, Ujt, Wit, Wjt)$$
   -variable definitions as above.

   c) Model Features:
   i) economic variables
   ii) static and dynamic
   iii) gross and net migration
   iv) multi-regional
   v) time-series

3. Molho, Ian

   a) Thesis: Within the framework of investment in human

capital, uncertainty, risk, expectations formation and adjustment cost play a role such that the decision to migrate is a dynamic process involving response lags.

b) Model:

$$Mij = f(Un, Ui, Uj, Wi, Wj, Ei, Ej, Phi, Phj, Hci, Hcj, LPIi, LPIj, D)$$

Mij = ratio of migrants to population
Un = national unemployment rate
Eij = employment growth in i & j
Phij = price of housing in i & j
Hcij = housing construction rate in i & j
LPij = location preference index in i & j
D = distance

c) Model Features:
i) economic-demographic-amenities
ii) dynamic
iii) multi-regional
iv) time-series

4. Silvers, Arthur L

a) Thesis: In evident contradiction of economic logic, labour all too frequently migrates to other than the 'net-returns' maximizing region.

b) Model:

$$Bij = f(Wj, Wi, Cij)$$

Bij = long term gain of migrating from i to j
Cij = cost of moving from i to j

c) Model Features:

i) economic
ii) multi-regional
iii) probability approach

5. Lianos, T. P

a) Thesis: Formulating the basic migration model (based on investment in human capital) as a stock changes the model from static to dynamic model and improves its performance.

b) model:

$$Mt = ak + (1-k)Mt-1 + kb(Xt - Xt-1) + k(ut - et-1)$$

$$0 < k < 1,\ b > 0,\ Xt > 0$$

$$Mt = kSmt + et$$

Mt = migration flow
Xt = wage differential
Smt = stock of migration
Ut, et = error terms
t = time

c) Model Features

i) economic (only wage differential)
ii) flow and stock of migration
iii) dynamic
iv) international

6. Liaw, K.-I, J. Ledent

a) Thesis: Does migration serve well to equalize economic opportunities between regions in Canada?

b) Model: incorporates pull and push factors

i) Destination (pull) model

Mj=f(Dij, Edij, RCj, RWj, RUBj, EGj, RPj)

Mj = migration to j
Dij = distance between i and j
EDji = index of ethnic dissimilarity in ji
RCj = relative coldness of j
RWj = relative wage rate in j
RUBj = relative unempl. benefit in j
EGj = relative empl. growth in j
RPj = population ratio of j

ii) Departure (push) model:

Mi = f(PLi, ICi, NPi, IACi, RUBi, RWi, GTPi, NIAC, NW, NUR, NEG)
PLi = population level in i
ICi = index of cultural attachement
NPi = percent pop. born outside i

IACi = index of age composition in i
GTPi = gov't transfer per capita
NIAC = national index for age composition
NW = national wage rate
NUR = national unemp. rate
NEG = national empl. growth rate

c) Model Features:

i) economic and non-economic
ii) probability approach
iii) distinguishes between pull and push factors
iv) time-series

APPENDIX C

DETERMINANTS OF MIGRATION: SUMMARY OF EMPIRICAL RESULTS

VARIABLE NAME	EXPECTED SIGN	ACTUAL SIGN	
i) MODIFIED GRAVITY MODEL			
			LEGENDS:
1. DISTANCE	-	-	i=origin
2. POP. RATIO OF j	+	+	j=destination
3. POP. RATIO OF i	-	-	?=mixed results
4. UNEMPL. IN i	+	?	
5. INCOME DIFFERENTIAL	+	?	
6. EMPL. GROWTH IN j	+	+	
7. VACANCY RATE IN J	+	?	
ii) PROBABILISTIC MODEL			
a) DESTINATION VARIABLES			
1. DISTANCE	-	-	
2. ETHNIC DISSIMILARITY	-	-	
3. RELATIVE COLDNESS	-	-	
4. REL. UNEMPL. BENEFIT	-	-	
5. RELATIVE WAGE RATE	+	+	
6. REL. EMPL.GROWTH RATE	+	+	
7. DESTINATION POP. SHARE	+	+	
b) ORIGIN VARIABLES			
1. POPULATION	-	-	
2. CULTURAL ATTACH. INDEX	-	-	
3. AGE COMPOSITION IND.	+	?	
4. GOV'T TRANSFER PERCAP.	-	?	
5. NAT. AGE COMP. INDEX	+	?	
6. NAT. UNEMPL. RATE	-	-	